

SOURCE INVENTORY

CATEGORY # 766

CIGARETTE/TOBACCO SMOKING

1999 EMISSIONS

Introduction

Emissions from tobacco smoking, particularly from cigarettes, cigars, and pipes, are presented in this category. Mainstream Smoke (MS), which is generated during puffs, are generally inhaled by the smoker and a small fraction is exhaled. Sidestream Smoke (SS), or the smoke issued from the product between puffs, is viewed as the most important emissions. Burning cigarettes may include total particulate matter, nicotine, phenol, CO₂, CO, NO_x, NH₃, hydrogen cyanide, and formaldehyde.

Methodology

A 1988 Gallop Poll showed 30% of the population are smokers. A recent finding showed that although there has been a decrease of adult smokers, there was also an increase in younger smokers, and therefore, it is still estimated 27% are still smoking regularly.

Cigarette consumption was estimated based on a report from Atmospheric Environment Journal, Vol. 21, No. 2, "Measuring Environmental Emissions from Tobacco Combustion: Sidestream Cigarette Smoke Literature Review", by M.R. Guerin, Higgins, & Senkins, July 1986. It was also reported about 48% of the smokers smoked less than a pack of cigarettes, 32% smoked one pack, 15% smoked two packs, and 5% smoked 2.5 packs or more per day.

Emission factors were derived based on the above report. Sidestream emissions were considered, which are the quantities per cigarette of individual constituents delivered into the environment. From Table 1 of the report, calculated SS emissions based on SS/MS ratios were converted into lbs. emission per cigarette:

Emission Factors					
	P	O	N	S	CO
lbs/thousand cigarettes	.0838	.0062	.0039	nil	.0729
lbs/ton cigarettes	81.86	6.023	3.849	nil	71.182

Sample calculations:

Estimated cigarettes consumed:

Based on 1996 Bay Area population:

$$6,416,896 \times 0.27 \times (0.48 \times 0.5 + 0.32 \times 1 + 0.15 \times 2 + 0.05 \times 2.5) \\ = 34,131,470 \text{ cigarettes/day}$$

$$\text{or } 34,131,470 \times 0.93 \text{ gm/cigs} \times 365 \text{ days/yr} / 454 \text{ gm/lb} / 2000 \text{ lb/ton} \\ = 12,760 \text{ Tons cigarettes/yr}$$

Even though the population in the Bay Area in 1999 increased, the number of cigarette smokers may remain at 1996 levels.

Monthly Variation

Monthly distribution was estimated to be the same throughout the year.

County Distribution

County population was used to distribute emissions for each county.

TRENDS

History

Emissions throughout the years were estimated based on ARB's dollar output on other manufacturing establishments.

Growth

Projections to year 2030 was based on the same growth profile on other manufacturing establishments. There is a strong lobby against smoking, and taxes are increasingly levied on cigarettes. Although cigarette manufacturing may still be on the rise, consumption is believed to be becoming less nationally and regular smokers may be down to 25 % or less in the next year or so. Cigarette consumption is still increasing outside the U.S., particularly in the third world countries.